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News and Views

A View on the Science: Physical Anthropology at the Millennium

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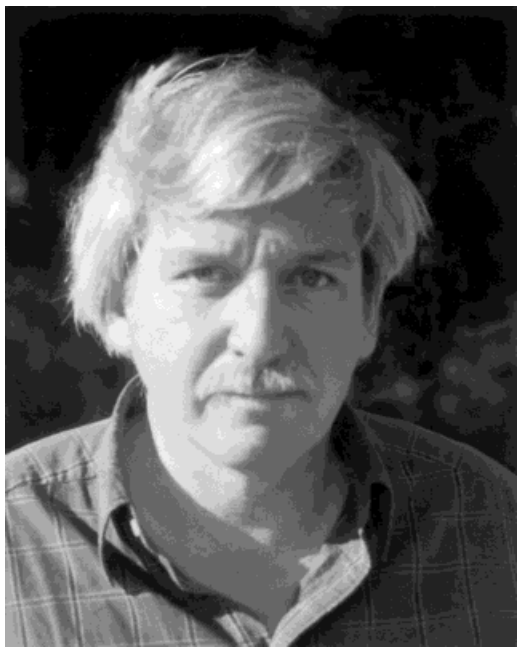
EDITOR'S NOTE The year 2000 marks the onset of the 21st century. In this transitional year, prominent physical anthropologists will provide brief reflections on our discipline, including what attracted them to it, and their views on the directions our discipline may pursue as we enter, in January 2001, the third millennium. Am J Phys Anthropol 112:145–148, 2000.



Phillip Walker is a Professor of Anthropology at the University of California, Santa Barbara. He is a leader in the field of bioarchaeology with broad research interests that include human evolution, dental anthropology, faunal analysis, bone chemistry, demography, paleopathology, forensics, and the impact of European contact on Native American populations. In 1992 the U.S. Secretary of Interior appointed him to a five-year term as a member of the Native American Graves Protection and Repatriation Act Review Committee. He is the past president of the Dental Anthropology Association and current Vice President of the American Association of Physical Anthropologists.

My introduction to physical anthropology was the culmination of more than a month of procrastination. In the fall of 1966, I was an incoming freshman at Indiana University with a scholarship that included the requirement that I take a work-study job. Eventually my desire to eat overcame my work aversion and I reluctantly turned myself in to the administrator responsible for giving needy students mind-numbing job assignments. By that time the available work "opportunities" had dwindled to two onerous activities all others had rejected: washing dishes in the student union and a repulsive assignment in the anthropology department that involved rotting animals and cadavers. I was overjoyed with my good fortune. I knew almost nothing about anthropology except for what I had gleaned from an offhand comment my brother made to encourage me to go to college: "they even have a department that gives classes on archaeology, monkeys, and people from weird places." This sounded like the perfect place for me. Soon I was happily ensconced in a laboratory full of skeletons, frozen animals, and books on anatomy, natural history, and archaeology where I was paid to do essentially the same research that I do today.

REFLECTIONS ON NATURE-NURTURE AND THE FUTURE OF PHYSICAL ANTHROPOLOGY

I had developed strong interests in biology and history long before my arrival at college. My fascination with biology, and especially functional anatomy, stems from a longstanding interest in how things work. Some of my earliest memories are of the hours I spent, when I was four or five years old and barely able to wield a screwdriver,

sitting in the middle of our living room floor disassembling and then unsuccessfully attempting to reassemble the movements of broken clocks my father brought to me as toys from his jewelry store. He continued to nurture my mechanical interests and by the age of nine, I began to work after school and on weekends in his shop as an apprentice goldsmith. Although mechanical training of this kind might seem antithetical to academic pursuits, the opposite was true for me; it nurtured my analytical skills, and gave me an appreciation for the importance of persistence and attention to detail that has been of enormous value throughout my scientific career.

My interest in history also derived from my family. My father and grandfather were both amateur historians and passed their fascination with the past on to me. I still remember the first time I touched something from an archaeological site; it was a drilled fragment of an Archaic period grey slate gorget my grandfather had discovered in a freshly plowed field. Holding this enigmatic object that some now long-dead person had handled thousands of years before filled me with a feeling of awe and curiosity about our predecessors that continues to motivate my research today.

In college I began to take classes from and eventually work as a research assistant for Georg K. Neumann. Dr. Neumann was an impressive character whose global interests in biology and archaeology resonated perfectly with mine. He had a voracious intellectual curiosity and an acquisitive nature that he fed through the collection of human skeletal remains from Midwestern archaeological sites and books (by the time of his death he had amassed a personal library of some 12,000 volumes).

Neumann's principal research interest was unraveling the population history of Native Americans (Neumann, 1952; Neumann, 1954). Although his morphometric work was heavily influenced by the typological approach that dominated physical anthropology during the first half of the twentieth century, he was well aware of the complicated effects that gene flow and developmental responses to cultural influences such as dietary change and activity pattern could have on the skeleton. He had an extraordinary visual memory that allowed him to recall individual details of the large skeletal collections he had examined during years of research on the peopling of the New World. Many of these skeletons showed the effects of artificial cranial deformation (Neumann, 1942), and this heightened his awareness of how complicated the genetic-environmental interactions are that determine the spatial-temporal patterns we see in human morphology. Newman's appreciation for the plasticity of human development, along with his perfectionist tendencies, led him to accumulate an enormous body of metrical and non-metrical information whose full analysis was well beyond the statistical and computational resources available to him before his death in 1971.

Neumann's predicament points out what I see as the key issue that physical anthropologists will face in the twenty-first century. The spectacular recent increases we are experiencing in the availability of powerful computers and digital input devices have enhanced our ability to quantify morphological variation to an extent that would have been inconceivable just a few decades ago (Dean et al., 1998). Unfortunately, there has been very little improvement in our capacity to meaningfully interpret the enormous quantities of data we can now collect and summarize statistically. Although it is currently possible to quantify Neumann's intuitive assessments of morphological similarities and differences, little headway has been made in making sense out of the intricate genetic-environmental interactions operating during growth and development that are the source of the morphological variation we can now quantify so precisely.

The current controversy over the significance of the cranial variation seen in the earliest inhabitants of the New World is a case in point (Powell and Neves, 1999). Much of the debate appears predicated upon unfounded assumptions about the ineffectiveness of natural selection, genetic drift, and phenotypic plasticity as forces capable of producing rapid morphological change. Unfortunately, such simplistic interpretations are the paleoanthropological norm. For example, much of

the current ascendancy of splitters in human origins research seems premised on a simplistic genes=morphology equation that is largely uninformed by the insights into the potency of environmental influences that are available to anyone who bothers to study any large modern skeletal series. This tendency to downplay environmental influences in favor of genetic determinism, of course, derives from the traditional paleontological preoccupation with reconstructing phylogenetic relationships. Incorporating a more sophisticated understanding of developmental plasticity into our reconstructions of genetic relationships will be a challenging endeavor (Liberman, 1999). Nevertheless, such research promises to be one of the most exciting and productive areas of physical anthropological research as we embark upon the new millennium.

My own research has emphasized the environmental end of the nature-nurture continuum. In 1974 I was hired by the Anthropology Department of the University of California, Santa Barbara. I soon realized that investigating the biological and cultural evolution of the Native Americans, who once lived on the offshore islands I could see a short distance from my office, had the potential to answer many of the questions that had preoccupied me as a student. As an undergraduate I had read MacArthur and Wilson's (MacArthur and Wilson, 1967) groundbreaking monograph on island biogeography and my appreciation for the value of islands as "natural laboratories" for elucidating evolutionary principles was nurtured further in courses I took from evolutionary theorists such as Leigh Van Valen when I was a graduate student at the University of Chicago.

Not only had the Chumash Indians who lived on the Channel Islands had the grace to shun the dismal practice of cremation that denudes the rest of southern California of osteological research materials, but they also had evolved a remarkably complex, chiefdom-level of social organization involving incipient social stratification and local craft specialization in the absence of agriculture. In addition to the extensive skeletal collections that are available from this interesting cultural-ecological context, there is an extremely rich ethnographic and ethnohistorical record for the historic period inhabitants of this area that is virtually unparalleled in North America (Hudson and Blackburn, 1982-1987; Walker and Hudson, 1993).

The most important selling point of the Santa Barbara Channel area from my perspective, however, was the year-by-year record of local environmental productivity recorded in the varved sediments of the Santa Barbara Basin (Pisias, 1978). This extraordinary 10,000-year-long record of environmental change, with a temporal resolution below that of a single human generation provides an extremely exciting context within which to explore the processes of biological and cultural evolution. For me, one of the frustrating aspects of paleoanthropological research is the dissonance between the fundamental issue that we are attempting to understand (the action of natural selection upon ancestral human populations) and the temporal frame of reference through which we are forced to view the environmental change that drives this process. In paleoanthropology, 100,000 years (5-6,000 generations) is considered a high level of resolution for paleoecological information! We know from studies of island faunas that speciation events can occur at far shorter intervals, and from this it is clear that the paleoanthropological temporal perspective is singularly unsuited for exploring many fundamental aspects of the processes involved in the emergence of our species and its subsequent evolution.

I gradually expanded the scope of my research from tooth wear to a broad range of issues relating to human biological and cultural evolution. For example, my studies of skeletal evidence for patterns of violence among the Chumash (Walker, 1989) led to a worldwide survey of patterns of cranial trauma as well as forensic research on the history of child abuse (Walker, 1997; Walker et al., 1997).

An unexpected and extremely gratifying aspect of my Channel Island research is the personal relationships I have been able to develop with modern Chumash descendants who, against all odds, have managed not only to survive but also thrive in an envi-

ronment permeated with racism and economic exploitation (Walker, 2000; Walker and Hudson, 1993; Walker and Johnson, 1994). The interest they have fostered in the resilience that native people show in the face of rapid cultural change has stimulated me to initiate research projects among the indigenous peoples of Africa, South America, and New Guinea (Walker, 1998; Walker and Hewlett, 1990). In a world in which "communications imperialism" (I have yet to visit a remote village bereft of a Michael Jackson tape) is rapidly erasing human biological and cultural diversity, such studies offer some of the most exciting and urgently needed areas of research for the next generation of physical anthropologists.

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